

CLAIMS:

What is claimed is:

1. An explosive severing device comprising:
an exterior housing having an interior extending between opposing distal ends of the housing;
an explosively coupled collection of explosive material located within the interior;
a first initiator coupled with the collection of explosive material at a first location;
a second initiator coupled with the collection of explosive material at a second location;
a third initiator coupled with the collection of explosive material at a location between the first and second location; and,
at least one detonator coupled to at least one of the initiators to initiate a timed sequence of initiation of the initiators contacting the explosive materials.
2. The device of Claim 1, wherein the housing is approximately tubular.
3. The device of Claim 1, wherein the collection of explosive material comprises a column of explosive material.
4. The device of Claim 1, wherein the collection of explosive material comprises a spherical mass of explosive material.
5. The device of Claim 1, wherein the first and second initiators are located at opposing ends of the explosive material and the third initiator is located at a point between the first and

second initiators.

6. The device of Claim 5, wherein the third initiator is coupled to a shaped-charge assembly located at a point between the first and second initiators.

7. The device of Claim 5, wherein the third initiator is coupled to a shaped-charge assembly with a liner and is located at a point between the first and second initiators.

8. The device of Claim 1, wherein the first and second initiators are each coupled to the detonator in a manner designed to produce approximately simultaneous initiation of the first and second initiators.

9. The device of Claim 5, wherein the third initiator is located at a point between the first and second initiators and is coupled to the detonator in a manner designed to produce initiation at a pre-selected time.

10. The device of claim 9, wherein the pre-selected time is prior to the initiation of the first and second initiators.

11. The device of claim 9, wherein the pre-selected time is approximately simultaneous to the initiation of the first and second initiators.

12. The device of claim 9, wherein the pre-selected time is subsequent to the initiation of the

first and second initiators.

13. The device of Claim 4, wherein a plurality of the initiators are interspersed upon the surface of the spherical explosive material.

14. The device of Claim 4, wherein a plurality of the initiators are interspersed within the surface of the spherical explosive material.

15. The device of Claim 4, wherein a plurality of the initiators are interspersed in close proximity to but offset from the surface of the spherical explosive material.

16. The device of Claim 1, where the initiators are electrical initiators.

17. The device of Claim 1, where the initiators are explosive initiators.

18. The device of Claim 1, where at least one of the initiators is an optical initiator.

19. The device of Claim 1, wherein at least some of the initiators are electrical initiators and wherein at least some of the initiators are explosive initiators.

20. The device of Claim 1, wherein the explosive materials have the same speed of propagation of a pressure wave.

21. The device of Claim 1, wherein the explosive materials have different speeds of propagation of a pressure wave.

22. A method for severing a tubular structure comprising:

locating within the tubular structure an explosively coupled collection of explosive material having a first region, a second region, and a third region at least partially in between the first and second regions;

creating at least two pressure waves traveling through the explosive material by using at least one initiator coupled to the first region of explosive material to initiate a first pressure wave in the first region of explosive material and by using at least one initiator coupled to the second region of explosive material to initiate a second pressure wave in the second region of explosive material;

creating at least one additional pressure wave in between the first and second pressure waves by using at least one initiator coupled to the third region of explosive material to initiate a third pressure wave in the third region of explosive material.

23. The method of Claim 22 wherein the first and second pressure waves are initiated approximately simultaneously.

24. The method of Claim 22 wherein the first and second pressure waves are initiated sequentially.

25. The method of Claim 23 wherein the third pressure wave is initiated prior to the initiation

of the first and second pressure waves.

26. The method of Claim 23 wherein the third pressure wave is initiated subsequent to the initiation of the first and second pressure waves.

27. The method of Claim 23 wherein the third pressure wave is initiated approximately simultaneously to the initiation of the first and second pressure waves.

28. The method of Claim 23 wherein the coupling point of the initiator initiating the third pressure wave is the initiation site of the third pressure wave; and,

wherein the third pressure wave is initiated prior to the arrival of either the first or second pressure wave at the initiation site of the third pressure wave.

29. The method of Claim 22 wherein a primary detonator is used to begin the timed initiation of the pressure waves; and,

wherein the timing of the initiation of the pressure waves is controlled by the use of explosive initiators of defined length coupling the primary detonator to the initiation sites of the respective pressure waves contacting the respective regions of explosive material generating the respective waves.

30. The method of Claim 22 wherein a primary detonator is used to begin the timed initiation of the pressure waves; and,

wherein the timing of the initiation of the pressure waves is controlled by the use of

electrical initiators coupling the primary detonator to the initiation sites of the respective pressure waves contacting the respective regions of explosive material generating the respective waves.

31. The method of Claim 22 wherein a primary detonator is used to begin the timed initiation of the pressure waves; and,

wherein the timing of the initiation of the pressure waves is controlled by the use of optical initiators coupling the primary detonator to the initiation sites of the respective pressure waves contacting the respective regions of explosive material generating the respective waves.

32. The method of Claim 22 wherein a primary detonator is used to begin the timed initiation of at least some of the pressure waves; and,

wherein the timing of the initiation of the first and second pressure waves is controlled by the use of explosive initiators of equal length coupling the primary detonator to the initiation sites contacting the first and second regions of explosive material respectively.

33. The method of Claim 22 wherein a primary detonator is used to begin the timed initiation of at least some of the pressure waves; and,

wherein the timing of the initiation of the first and second pressure waves is controlled by the use of explosive initiators of unequal length coupling the primary detonator to the initiation sites contacting the first and second regions of

explosive material respectively.

34. The method of Claim 22 wherein a primary detonator is used to begin the timed initiation of at least some of the pressure waves; and,

wherein the timing of the initiation of the first and second pressure waves is controlled by the use of electrical initiators coupling the primary detonator to the initiation sites contacting the first and second regions of explosive material respectively.

35. The method of Claim 22 wherein the third region of explosive material comprises a shaped-charge; and

wherein the shaped-charge is initiated prior to the arrival of either the first or second pressure wave at the initiation site of the shaped-charge.

36. The method of Claim 35, wherein the shaped charge in the third region of explosive material has a liner.

37. The method of Claim 36, wherein the shaped-charge pre-scores the tubular structure radially outward from the shaped-charge prior to the arrival either the first or second pressure wave at the tubular structure radially outward from the shaped-charge.

38. The method of Claim 36, wherein the shaped-charge pre-scores the tubular structure radially outward from the shaped-charge approximately simultaneously to the arrival of the first and of the second pressure wave at the tubular structure radially outward from the shaped-charge.

39. A method for impacting a structure, wherein the method comprises:
- locating proximate to the structure an explosively coupled collection of explosive material having a first region, a second region, and a third region at least partially in between the first and second regions;
 - creating at least two pressure waves traveling through the explosive material by using at least one initiator coupled to the first region of explosive material to initiate a first pressure wave in the first region of explosive material and by using at least one initiator coupled to the second region of explosive material to initiate a second pressure wave in the second region of explosive material;
 - creating at least one additional pressure wave in between the first and second pressure waves by using at least one initiator coupled to the third region of explosive material to initiate a third pressure wave in the third region of explosive material.